How confident can parents and professionals be that engaging in the Arrowsmith Program™ will be money well-spent?

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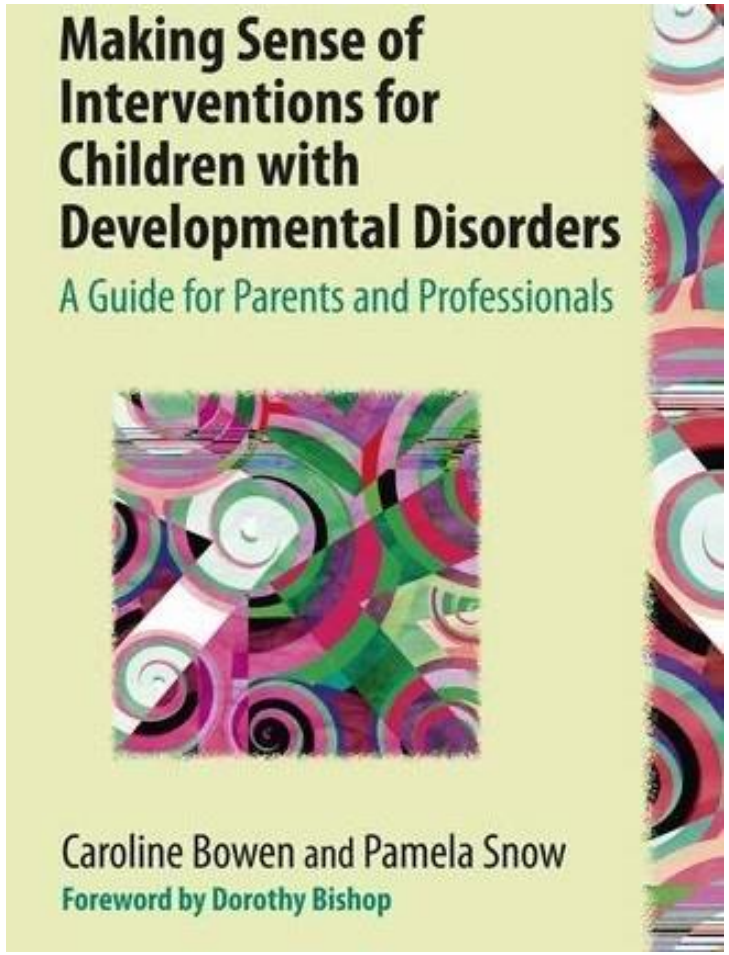
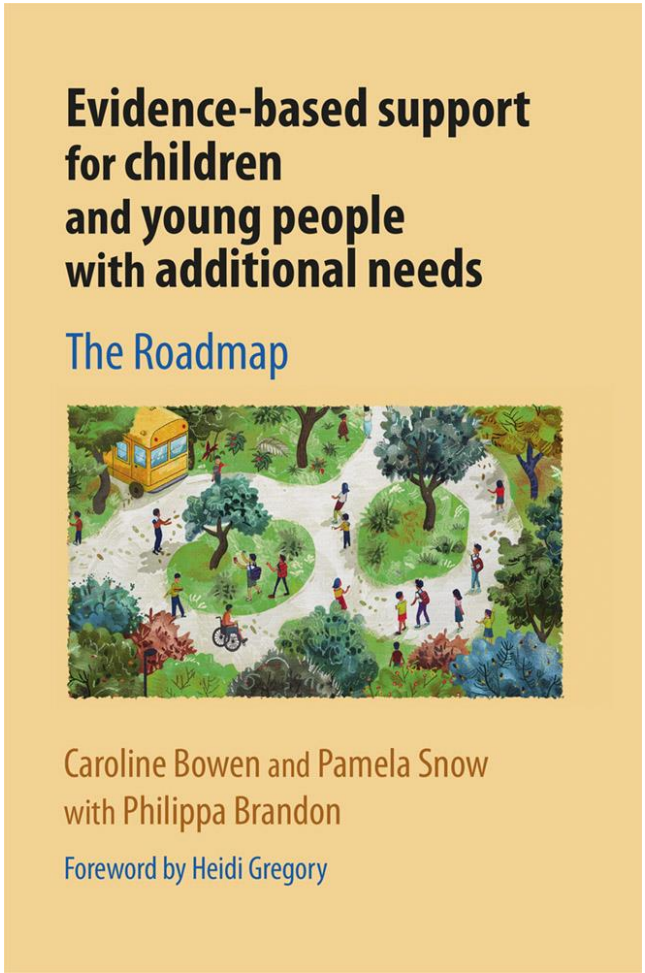
Bowen & Snow 2017 — 2nd edition in preparation for 2026
Bowen & Snow with Philippa Brandon expected 2025


Making Sense of Interventions for Children with Developmental Disorders
A Guide for Parents and Professionals
Caroline Bowen and Pamela Snow
Foreword by Dorothy Bishop


Evidence-based support for children and young people with additional needs
The Roadmap
Caroline Bowen and Pamela Snow with Philippa Brandon
Foreword by Heidi Gregory

Bowen, 2020

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Background to Arrowsmith™ 1977—2020

The Arrowsmith Program™ | Arrowsmith™

- Started as a tutoring service in Toronto in the late 1970s by Barbara Arrowsmith Young, B.A.Sc., M.A.
- Is based on her misinterpretations of the foundational **neuroplasticity** and brain **localization** work by A.R. Luria (1902-1977) and Mark Rosenzweig (1922-2009).
- Is promoted as a remedial methodology for specific learning disabilities based on neuroscience research and 40 years' experience of administering its system of **"specific cognitive exercises"** in 19 categories.

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- The **cognitive exercises** are said to have changed Arrowsmith Young's brain, all but eliminating her disabilities, when self-administered in 1977-1978 (Brainex Corporation, 2015a).
- Arrowsmith's self-identified disabilities included dyslexia, dyscalculia and incoordination, difficulties with: expressive language, "spatial reasoning", logic, and "kinaesthetic perception" (Arrowsmith Young, 2013; 2017).
- Aspects of these issues persist.
- Few question Arrowsmith Young's good intentions.

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The exact content of Arrowsmith™ is proprietary

Only approved, paying, licensed schools, and Arrowsmith™-trained teachers can access it.

Not circulating the exercises and methodology meant:

- other adults couldn't "train their brains" themselves;
- parents couldn't view the curriculum;
- independent researchers couldn't develop evidence of effectiveness.

Arrowsmith™

- Commercialized, without empirical evidence, in 1980.
- 6 Eaton-Arrowsmith schools: 5 in Canada, 1 in the US.
- Students from AU, Canada, Taiwan, UK and US enrolled.
- Self-contained classes operate **under license** in >100 schools:
  Australia, **Canada**, **the Caymans**, **S Korea**, **Spain**, **Switzerland**, **Malaysia**, **NZ**, **Thailand**, **USA, PLUS "prospective schools" have signed on in Australia, Estonia**

https://arrowsmithschool.org/participating-sites/

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Arrowsmith™

Arrowsmith was and is popularized via websites, media interviews, national and international lecture tours, “believers” (parents and teachers) and books.

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Books

- Arrowsmith Young, B. (2013; Revised 2017). *The woman who changed her brain: How I left my learning disability behind and other stories of cognitive transformation*. New York, NY: Free Press.
- Doidge, N. (2007). *The brain that changes itself: Stories of personal triumph from the frontiers of brain science,* New York, NY: Viking Press.
- Eaton, H. (2018). *The brain pioneer: The true story of how Barbara Arrowsmith-Young used brain science to help children with learning disabilities*, Vancouver, BC: Glia Press.

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New Arrowsmith™ sites are established constantly

Welcome to Arrowsmith School Online

Build a Stronger Brain. Create a New Reality. Transform your Future.

Welcome to Arrowsmith Schools' newest location – online!

We are so pleased to introduce this new community and look forward to supporting your family through cognitive change

– **Adriene Pratt** – Head of School

New in Sep 2020: Parents pay CA$18,000 per annum

https://arrowsmithschool.org/arrowsmith-schoolonline/

No internal development of Arrowsmith™ since 1977

Arrowsmith™ has not changed in response to research published over the last 40 years.

BUT

- Neuroscience has changed.
- The science-of-reading has changed.

Reputable interventions reflect the current research literature.

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Teachers and Students

Arrowsmith™ Teachers

- are chosen by their school to do a 3-week summer course based on the Arrowsmith™ Reference Manual;
- select students to participate in their class;
- conduct initial and year-end web-based assessments;
- provide parents with homework;
- enter students' progress through the exercises, once a month, in an online Record of Program;
- can liaise online with an Arrowsmith™ Coordinator.

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Full-time students in Grades 1—12

- start with a 1-day online assessment on enrolment;
- are reassessed at the end of the school year;
- have 2 periods of English and Maths and 6 periods of cognitive exercises daily for three or four school years;
- are required to do homework supervised by parents;

Student : Teacher Ratio 7:1.

Students don’t experience the regular school curriculum and typical interaction with peers and teachers.

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It may take 1 to 2 years for the effects of the exercises to kick in; tutoring may be needed.

"Upon completion of the program some students may require one to two years to gain experience using their newly strengthened cognitive capacities and some students may need tutoring initially to bring academic skills to grade level given their gaps in academic learning."

https://arrowsmithschool.org/program-faqs/

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Originally intended for children, Arrowsmith™ has come to be marketed to ALL age-groups, promising improvement in:

Attention
Auditory memory
Comprehension
Logical reasoning
Mathematics
Nonverbal learning
Problem-solving
Processing speed

Reading in those with Dyslexia
Visual memory
Writing

Could ONE intervention really address ALL of these issues?

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The Arrowsmith Program™

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Arrowsmith™

- Comprises 12,000 discrete levels of intensive, graduated, and strenuous **cognitive exercises** in 19 categories.

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Academic exercises & cognitive exercises

- An **academic exercise** is work, directly related to the curriculum, at a school, college, or university. It centres on studying, reasoning, and integrating new knowledge rather than on practical, technical, or underlying skills
- **Structured literacy instruction** (International Dyslexia Association, N. D.) comprises academic exercises.
- **Cognitive exercises** are directed towards “brain training” (Castles & McArthur, 2013).

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INTERROBANGS AHEAD

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- **Broca's speech pronunciation deficit** (Broca's area) ?
- **Auditory speech discrimination deficit** (Superior temporal lobe) ?
- **Symbolic thinking deficit** (Prefrontal cortex) ?
- **Kinesthetic perception deficit** (Parietal lobe) ?

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- **Broca's speech pronunciation deficit** impairs articulation, vocabulary, and speaking-and-thinking concurrently;
- **Auditory speech discrimination deficit** impairs rhyme recognition;
- **Symbolic thinking deficit**—impairs attention span and "mental initiative";
- **Kinesthetic perception deficit**—causes ungainliness, a tendency to crash into objects, and sometimes, messy handwriting.

Invented terms and brain diagrams may reassure customers of Arrowsmith's neuroscientific credentials.

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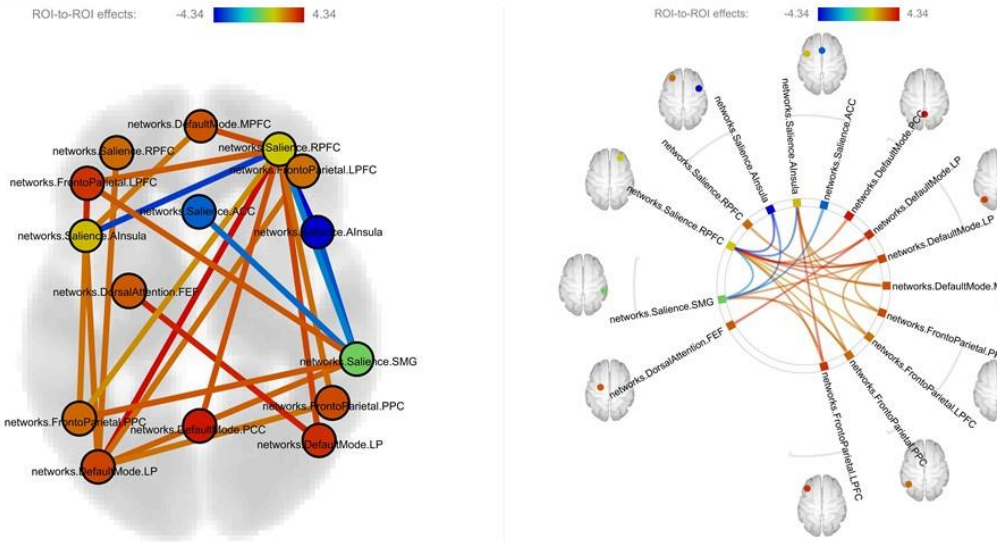
Invented terms and brain diagrams may reassure customers of Arrowsmith's neuroscientific credentials.

Arrowsmith PROGRAM
Strengthening Learning Capacities®

Network Connectivity

Students with Learning Disabilities



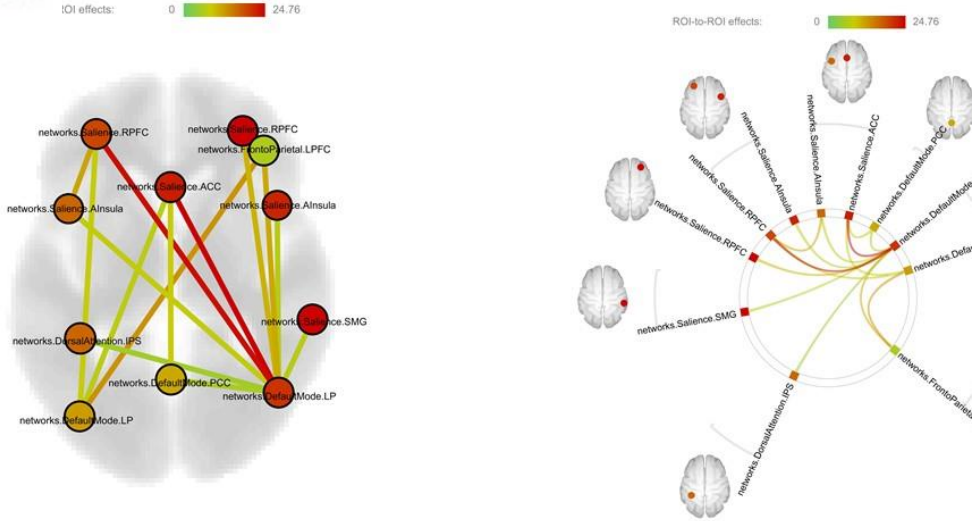
Red lines indicate stronger connections, and blue lines weaker, in LD students before Arrowsmith

(Research presented March 2019, Cognitive Neuroscience Society Annual Conference, San Francisco)

Arrowsmith PROGRAM
Strengthening Learning Capacities®

Strengthened Network Connectivity

6 week Cognitive Intensive Program (Symbol Relations)



Warmer colors indicate relatively stronger connectivity between network components.
Changes are proportional to Symbol Relations improvement.
Most changes are within or between the Salience and Default Mode networks.

(Research presented September 2018, Resting State Sixth Biennial Conference on Brain Connectivity, Montreal)

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The Arrowsmith™ cognitive exercises are

- Unrelated, or at best, tenuously related to reading.
- Unrelated to research by Luria and Rosenzweig.
- Based on UNKNOWN (to the-science-of-reading) mechanisms that are supposed to impact literacy acquisition; and remediate:

dyslexia, dyscalculia, “spatial reasoning”, expressive language difficulties, and incoordination;
and difficulties with logic and “kinaesthetic perception”.

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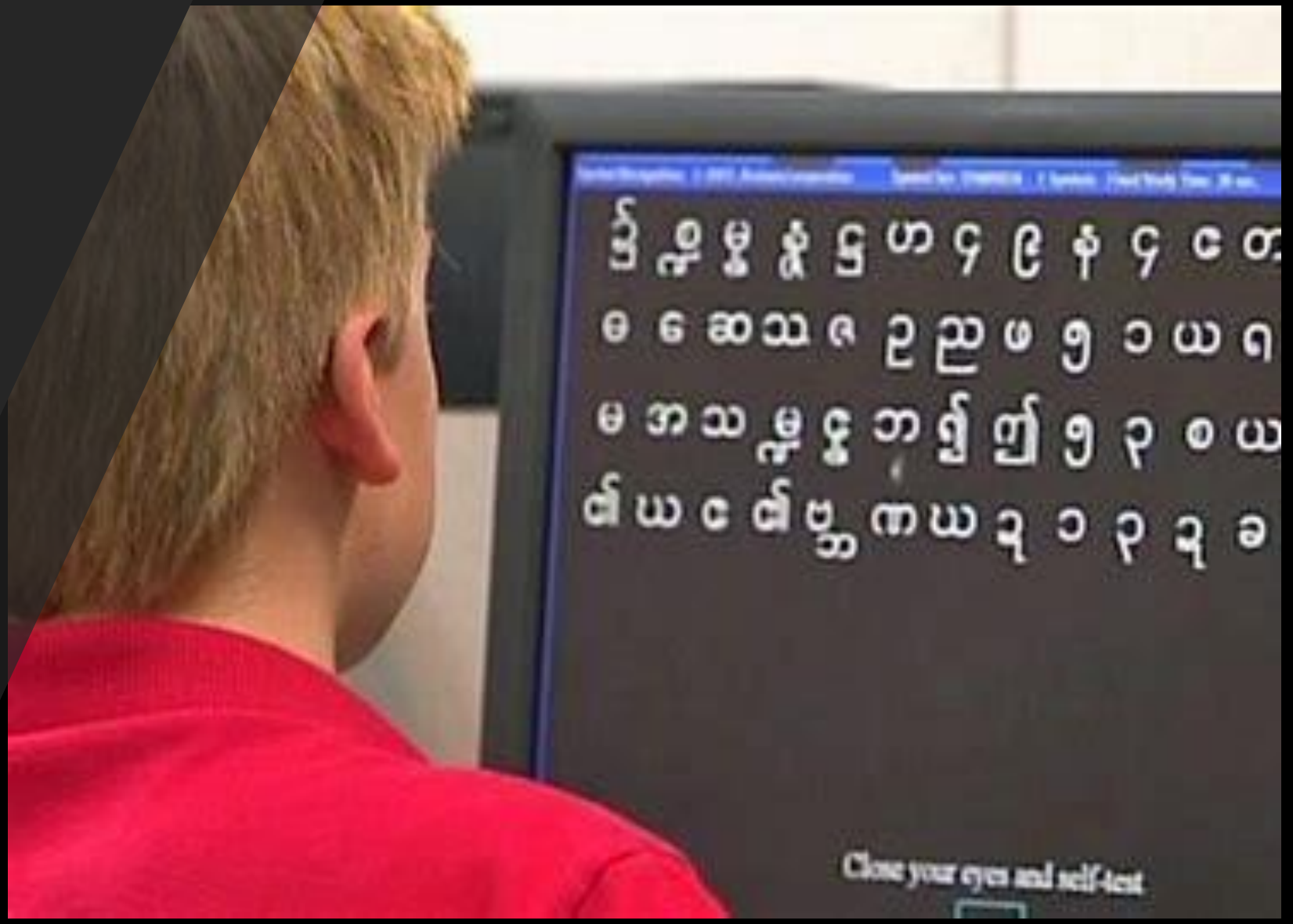
Examples of Arrowsmith™ cognitive exercises

Motor symbol sequencing

"Close your eyes and self-test"

Delivered via a computer.



Examples of Arrowsmith™ cognitive exercises

Motor symbol sequencing

Delivered as a pencil and paper task.

Motor Symbol Sequencing

- A student traces and reproduces letters and numbers from English and other writing systems (e.g., Arabic), and symbols, with an eyepatch over the left eye, to make the right eye “work harder” (unachievable).
- This is done repeatedly for up to 30 minutes.
- It is said to stimulate the motor cortex, improving
  - “tracking” (for reading),
  - binocular vision,
  - responsiveness to visual cues.

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Memory for information or instructions

Memory for information or instructions

- A student listens to the lyrics of a song many times, until they can repeat them from memory.
- The lyrics are adjusted to become increasingly challenging for the student to remember.
- This is said to remediate a memory deficit in the left temporal lobe.

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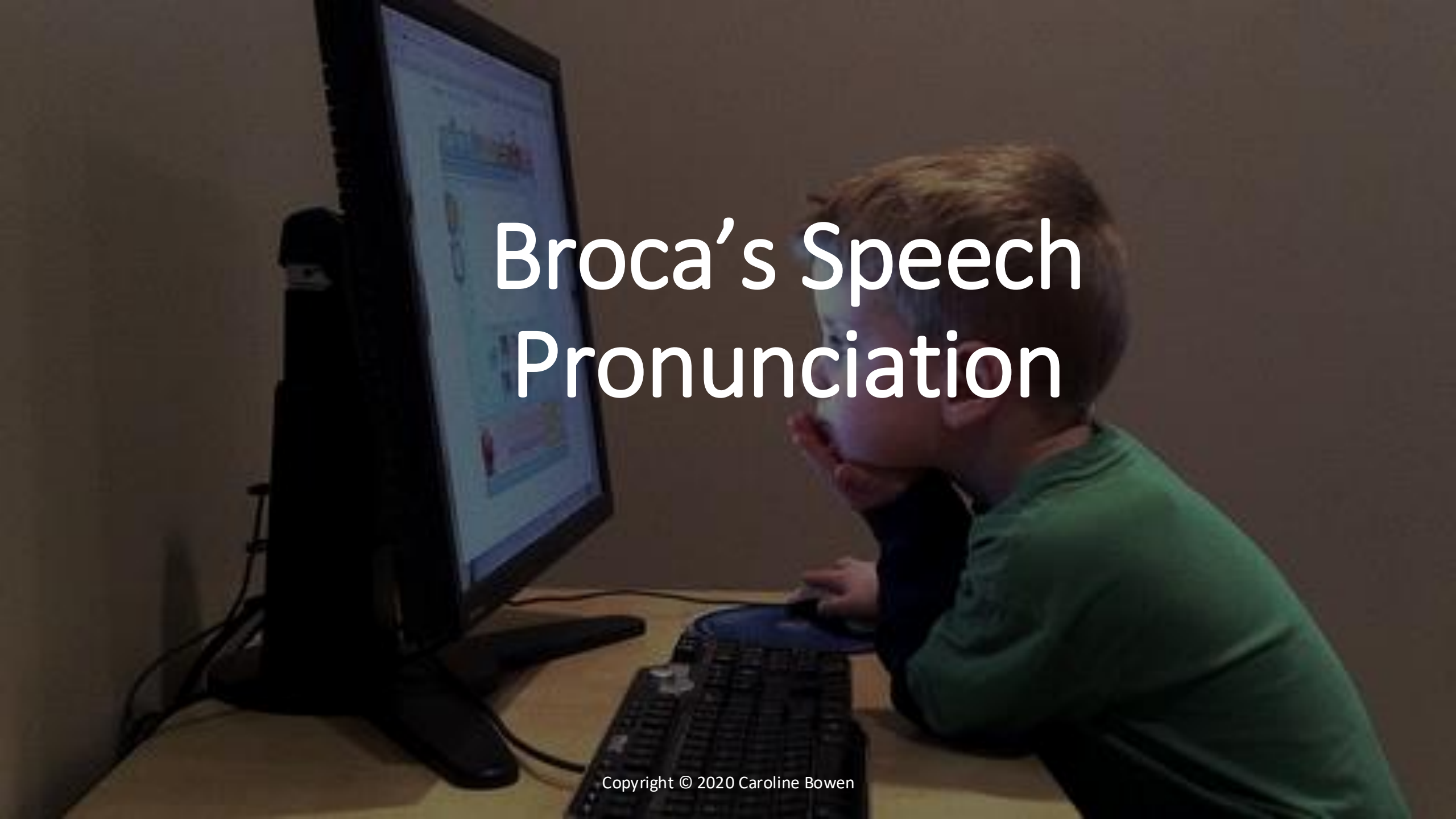

Broca's Speech Pronunciation

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Broca's Speech Pronunciation

- A students reads, repeatedly, from a screen, randomly generated, multisyllabic nonwords, with varying stress: **man**-tie-rick, man-tie-**rick**, man-**tie**-rick.

This is said to help with

- sound-symbol correspondence
- learning new words (vocabulary)
- Pronunciation
- talking and thinking simultaneously.

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Symbol Relations

A student reads a clock with multiple hands. This is said to correct a deficit at the juncture of the left occipital, parietal and temporal lobes. Problems it's supposed to address include

- Trouble telling the time
- Keeping letters in sequence

Research Evidence

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Just one (PROBLEMATIC) study has been published in a peer reviewed journal (Weber, et al. 2019) …

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Weber, R. C., Denyer, R., Yeganeh, N. M., Maja, R., Murphy, M., Martin, S., … & Boyd, L. (2019) Interpreting the preliminary outcomes of the arrowsmith Programme: a neuroimaging and behavioural study, *Learning: Research and Practice*, *5(2),* 126-148.

- Participants' LDs unconfirmed.
- 9/28 WNL on baseline testing.
- No control group comparisons.
- Potential for practice-effects because the pre- and post- tests were too close together.
- Regression to the mean because initial scores were low, and the same tests were used both times.
- No "blinding" (masking).
- The nature, "levels", frequency and intensity of the participants' cognitive exercises, from the 19 categories, were not reported.
- No "individualization" details.
- Little detail of what the students practised, so independent replication will be challenging.
- etc.

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Comparing Arrowsmith™ with interventions based on the science of reading

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EBP: Structured Literacy instruction …

… incorporates “a strong core of highly explicit, systematic teaching of foundation skills such as decoding and spelling skills, as well as explicit teaching of other important components of literacy such as vocabulary, comprehension, and writing.”
International Dyslexia Association, n.d.

https://dyslexiaida.org/

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THE FIVE "BIG IDEAS" OF EFFECTIVE READING INSTRUCTION

1. Vocabulary
2. Comprehension
3. Fluency
4. Phonemic awareness
5. Phonics-based instruction

Typical learners, and children and adults with reading difficulties, need these five, delivered in a combination that is:

- **Individualized** via expert initial and regular ongoing assessment
- **Monitored** closely for each student
- **Intensive** and
- **Explicit** - focused on reading *per se* and not a set of disparate subskills

National Reading Panel, 2000; Rowe, 2005; Rose, 2006

These form the essence of the science of reading.

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HERE ARE THE TOP 10 COGNITIVE FUNCTIONS THAT THE ARROWSMITH PROGRAM STRENGTHENS.

- MOTOR SYMBOL SEQUENCING
- SYMBOL RELATIONS
- MEMORY FOR INFORMATION OR INSTRUCTIONS
- PREDICATIVE SPEECH
- BROCA'S SPEECH PRONUNCIATION
- SYMBOLIC THINKING
- SYMBOL RECOGNITION
- LEXICAL MEMORY
- NON-VERBAL THINKING (ARTIFACTUAL THINKING)
- QUANTIFICATION SENSE

Admissions

BARBARA ARROWSMITH-YOUNG

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DOES ARROWSMITH™ TARGET THE BIG 5?

1. Vocabulary **NO**
2. Comprehension **NO**
3. Fluency **NO**
4. Phonemic awareness **NO**
5. Phonics-based instruction **NO**

IS ARROWSMITH™

- **Individualized** **NO** one size fits all
- **Monitored** **NO** one assessment annually
- **Intensive** **YES!** But it targets the wrong things
- **Explicit** **NO** it trains disparate subskills
- **Theoretically sound** **NO**

WHAT IS ITS LEVEL OF EVIDENCE?

- Testimonial
- In-house conference and "event" posters
- One flawed study (Weber et al 2019)
- Books

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National Reading Panel, 2000; Rowe, 2005; Rose, 2006

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Costs

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In 2017 schools paid $4,500 pa for a license and were free to set their own Arrowsmith tuition fees.

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MONEY WELL SPENT?

Arrowsmith™ fees: CA$18,000—$26,500 pa in 2019—2020

➕public or private school fees ➕ tutoring fees

➕travel & accommodation costs for overseas students,

for an intervention unsupported by research evidence.

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Opportunity Costs

SCHOOLS
forfeit funds, facilities and resources that could be more productively allocated; and risk reputational consequences.
PARENTS and ARROWSMITH™ TEACHERS
waste time, effort, energy, emotion, hope, goodwill and resources that would be better-invested in evidence-based interventions.
ARROWSMITH™ STUDENTS

miss out on appropriate assessment, intervention and available education possibilities.

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References and Resources

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References

- Arrowsmith-Young, B. (2013; Revised 2017). *The woman who changed her brain: How I left my learning disability behind and other stories of cognitive transformation*. New York, NY: Free Press.
- Bishop, D. V. M. (2015). *Opportunity cost: A new red flag for evaluating interventions for neurodevelopmental disorders.* Retrieved Nov 15, 2020 from http://deevybee.blogspot.com/2015/08/opportunity-cost-new-red-flag-for.html
- Bowen, C. (2020). Independent Research and the Arrowsmith Program™, *Perspectives on Language and Literacy, 46(1)*, 48-54. https://mydigitalpublication.com/publication/?m=13959&i=655062&p=46
- Bowen, C., & Snow, P. (2017). *Making Sense of Interventions for Children with Developmental Disorders*. Guildford: J&R Press, pp 220-255.

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- Brainex Corporation (2015a). *About the Arrowsmith Program*. Retrieved March 17, 2020 from www.arrowsmithschool.org/arrowsmithprogram/
- Castles, A., & McArthur, G. (2013). 'Brain-training' … or learning, as we like to call it. *LDA Bulletin, 45(1)*, 6. *Box Hill, VIC: Learning Difficulties Australia*.
- International Dyslexia Association: IDA (n.d.). Structured Literacy Works, But What Is It? Retrieved Nov 30, 2020 from https://dyslexiaida.org/structuredliteracy/
- National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. Washington, DC: National Institutes of Health. https://www.nichd.nih.gov/publications/pubs/nrp/smallbook
- Olswang, L. B. (1998). Treatment efficacy research. In C. M. Frattali (Ed.), *Measuring outcomes in speech-language pathology* (pp. 134–150). New York, NY: Thieme.

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- Rose, J. (2006). *Independent Review of the Teaching of Early Reading*. UK: Department for Education and Skills. Retrieved Nov 15, 2020 from https://dera.ioe.ac.uk/5551/2/report.pdf
- Rowe, K. (2005). National Inquiry into the Teaching of Literacy. Melbourne: ACER. https://research.acer.edu.au/tll_misc/5/
- Siegel, L. (2012). Confessions and reflections of the black sheep of the learning disabilities field. *Australian Journal of Learning Difficulties, 17(2)*, 63-77. https://www.researchgate.net/publication/271757801_Confessions_and_reflections_of_the_black_sheep_of_the_learning_disabilities_field
- Snow, P. C. (2015). Why not everyone is enthusiastic about the Arrowsmith Program. *The Snow Report.* Retrieved Nov 18, 2020 http://pamelasnow.blogspot.com/2015/05/why-not-everyone-is-enthusiastic-about.html

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- Spear-Swerling, L. (2019). Structured Literacy, *Perspectives on Language and Literacy, 45(3)*, 7-9. Retrieved Nov 15, 2020 https://mydigitalpublication.com/publication/?m=13959&i=607758&p=6
- Weber, R. C., Denyer, R., Yeganeh, N. M., Maja, R., Murphy, M., Martin, S., Chiu, L., Nguy, V., White, K., & Boyd, L. (2019) Interpreting the preliminary outcomes of the arrowsmith Programme: a neuroimaging and behavioural study, *Learning: Research and Practice*, DOI: 10.1080/23735082.2019.1674908
- Wheldall, K., & Wheldall, R. (2014). The story of MultiLit: Effective instruction for low-progress readers. *Perspectives on Language and Literacy, 40(3)*, 32-39. https://app.box.com/s/42s4h3mmc6ezhc1x0i6hsseqrfbs31b0
- Wheldall, K., Wheldall, R., Madelaine, A., Reynolds, M., & Arakelian, S. (2017). Further evidence for the efficacy of an evidence-based, small group, literacy intervention program for young struggling readers. *Australian Journal of Learning Difficulties, 22*, 3-13.

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Resources

five from five

https://fivefromfive.com.au

Parker Phonics

https://www.parkerphonics.com

THE READING LEAGUE

https://www.thereadingleague.org

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